Contribution ID: **21** Type: **not specified**

Improved Observation Usage in Numerical Weather Prediction (iOBS)

Tuesday, 21 May 2019 16:15 (45 minutes)

Observations from the "Internet of things"(IoT), such as intelligent cars, phones, buildings and personal weather stations (PWS), including commodity weather sensors, provide detailed information on local to hyper-local meteorological phenomena. This NordForsk infrastructure project (iOBS) will accommodate an increasing amount and diversity of observation data, and provide a system of harmonised data pooling and merging. The targeted breakthrough and measurable benefit of iOBS is the effective assimilation of diverse observations in regional high-resolution NWP models for the delivery of reliable and accurate weather forecasts and warnings for the benefit of operations, business and society. The basis will be the current operational NWP model, AROME-MetCoOp and/or the very recent addition of a nowcasting suite. At the same time, there is currently a significant and unnecessary diversity at the different National Meteorological Institutes in formats, file structures and (local) software used for observation handling and pre-processing. This fragmented data handling introduces redundancies, errors and missing observations, and the consequence is that valuable information is lost. iOBS wil therefore introduce the Scalable Acquisition and Pre-Processing system (SAPP) for a joint observations handling.

The project will enable use of high-resolution and high-frequency observations. This requires to improve, develop and implement timely quality control (QC) algorithms for a massive amount of private observations of surface pressure. To our knowledge, if successful this will be the first time private pressure observations are assimilated in an operational NWP system.

The observation data flow will be built in parallel on two future generation e-infrastructures: MET Norway's PPI and Glenna-2. PPI provides flexibility, scalability in computing data storage capacity and full end-to-end data integrity to meet modern requirements on data consistency. PPI offers the benefits of both building on existing operational solutions, run as an operational environment and act as a reference to the cloud service. Glenna-2 will make effective use of hybrid environments combining specialized HPC resources and for example container technology with the more flexible cloud delivery model. Having two e-infrastructures solutions offers redundancy and flexibility, addressing the needs and requirements of Nordic (and beyond) research and operations.

The benefits of this 2-year project include:
- Improved NWP forecast quality from increased number of observations used in data assimilation
- Improved QC algorithms for pre-processing private observations
- Reduced cost for software maintenance and development
- Improved conditions for Nordic research collaboration on both novel technologies and handling of different observation types
- Knowledge transfer across scientific disciplines and technological solutions
- Redundancy and flexibility by using both a cloud based research infrastructure (Glenna-2) and a proven operational infrastructure (PPI)
- Raise awareness of benefits of public-private partnerships, e.g. our QC will inform data manufacturers about their data quality

The project partners are CSC, FMI, MET Norway and SMHI.

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Session Classification: Improved Observation Usage in Numerical Weather Prediction (iOBS)